

USER'S MANUAL and INSTALLATION GUIDE

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Thank You

Thank you for purchasing an Aerotech Curtain Machine. Aerotech equipment is designed to be the highest performing, highest quality equipment you can buy. With the proper installation and maintenance, it will provide many years of service.

PLEASE NOTE

To achieve maximum performance and insure long life from your Curtain Machine, it is essential that it be **installed and maintained properly**. Please read all instructions carefully before beginning installation.

WARRANTY

For Warranty claims information see the "Warranty Claims and Return Policy" form QM1021 available from the Aerotech Ventilation System, Munters Corporation office at 1-800-227-2376 or by e-mail at aerotech@munters.com.

Conditions and Limitations:

- Products and Systems involved in a warranty claim under the "Warranty Claims and Return Policy" shall have been properly installed, maintained and operated under competent supervision, according to the instructions provided by Aerotech Ventilation Systems, Munters Corporation.
- Malfunction or failure resulting from misuse, abuse, negligence, alteration, accident or lack of proper installation or maintenance shall not be considered a defect under the Warranty.

UNPACKING THE EQUIPMENT

Before beginning installation, check the overall condition of the equipment. Remove packing materials, and examine all components for signs of shipping damage. Any shipping damage is the customer's responsibility and should be reported immediately to your freight carrier.

Each crate includes:

- 1 - Curtain Machine with internal brake
- 1 - Hardware Package

HP1065 for Curtain Machine

[A] 4 - $\frac{3}{8}$ " x 3.5" Hex Head Lag Screw ZP

[B] 4 - $\frac{3}{8}$ " Flat Washer ZP

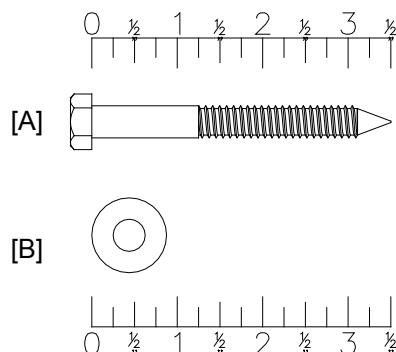
Actuator Specifications

Power: 110 - 120 VAC

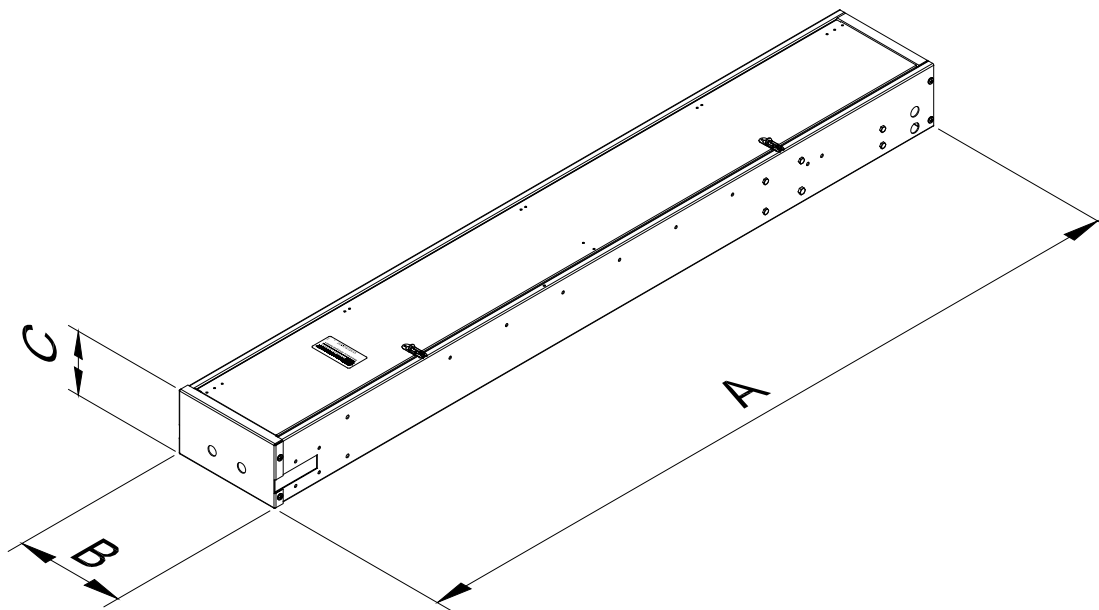
Amps: 1.0

Phase: 1 Frequency: 60 Hz

Load capacity: 4000 lbs.



DIMENSIONS



Model	Travel Length	Drive Speed	Lift Rate	A	B	C
BA4xx2-03	25.5"	3 rpm	$\frac{3}{4}$ "/min.	58"	10 $\frac{1}{4}$ "	6"
BA4xx2-30	25.5"	30 rpm	7 $\frac{1}{2}$ "/min.	58"	10 $\frac{1}{4}$ "	6"
BA4xx3-30	37.5"	30 rpm	7 $\frac{1}{2}$ "/min.	70"	10 $\frac{1}{4}$ "	6"
BA4xx4-30	49.5"	30 rpm	7 $\frac{1}{2}$ "/min.	82"	10 $\frac{1}{4}$ "	6"
BA4xx6-30	73.5"	30 rpm	7 $\frac{1}{2}$ "/min.	106"	10 $\frac{1}{4}$ "	6"

NOTE: These actuators are designed to open or close Aero-baffle, Aerotech modular-inlets or curtains accordingly from signals received from any one of Aerotech's Air-Monitor Controls or Environmental Computer Controls.

Munters Corporation

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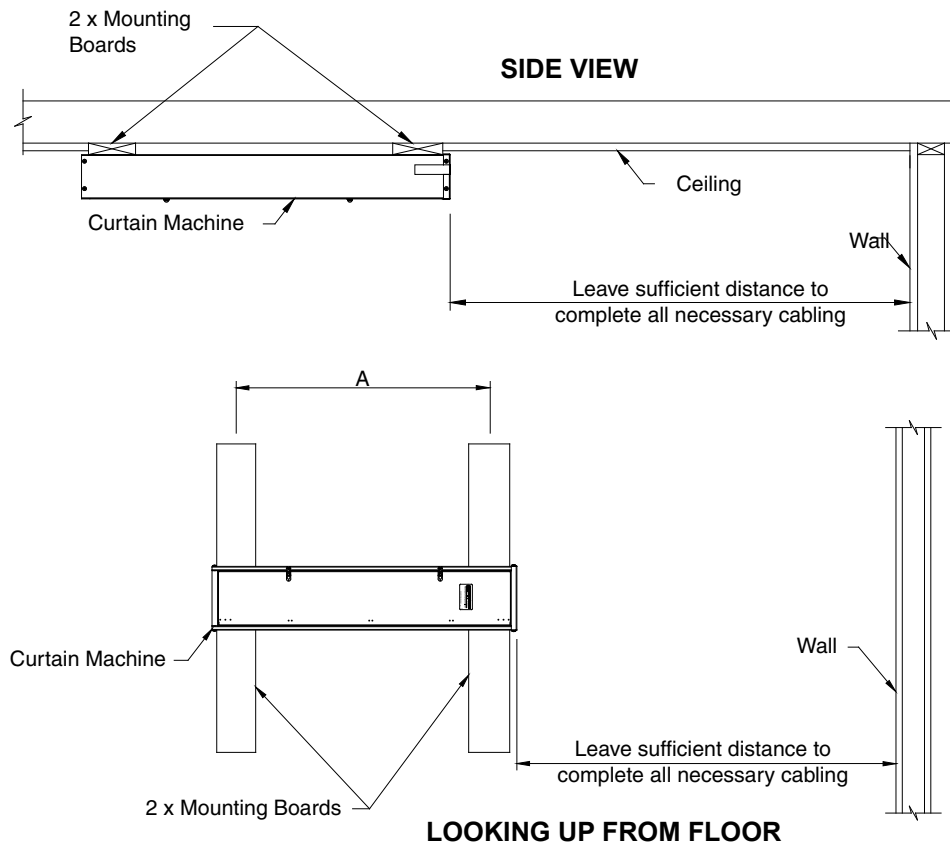
FORM: QM1158

Rev. 3, October 2009

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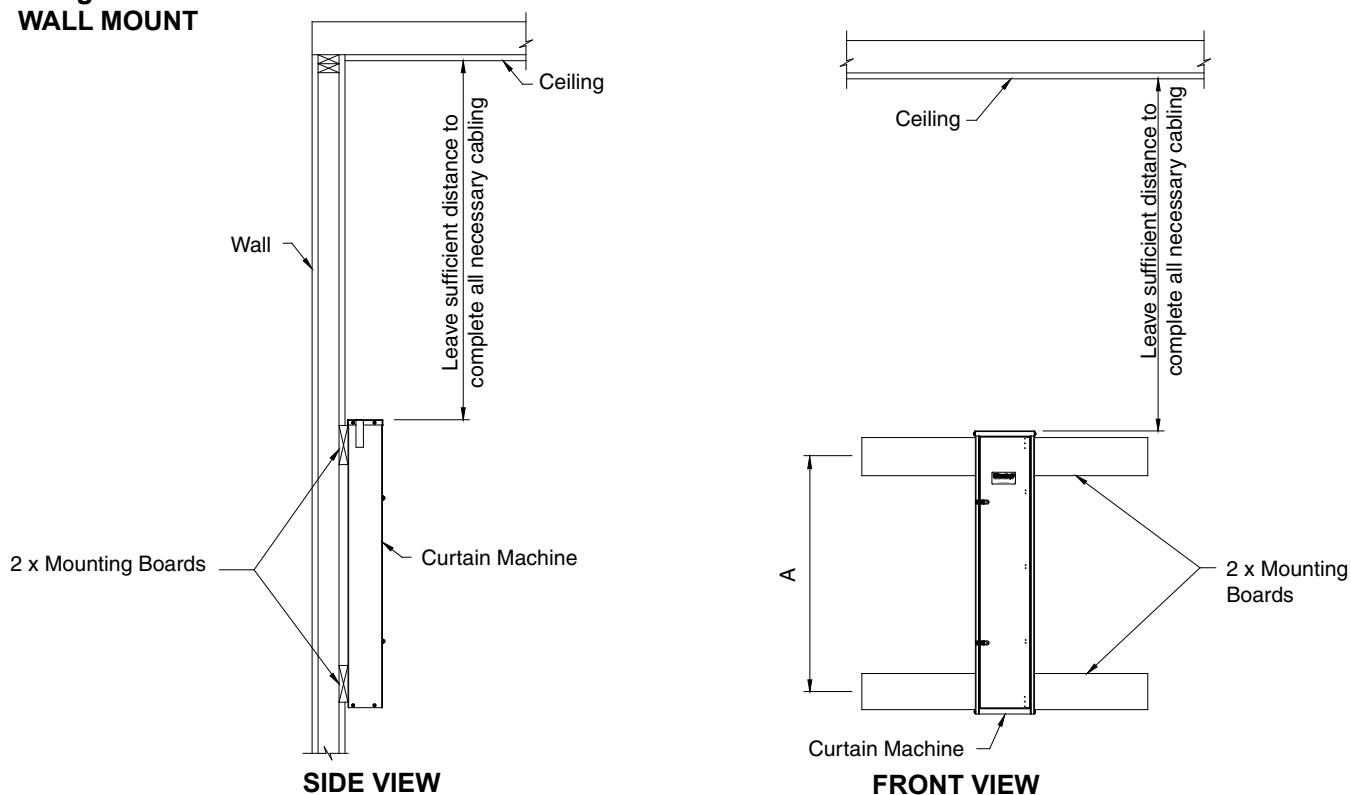
TYPICAL MOUNTING CONFIGURATIONS

Figure 1
CEILING MOUNT



Model	A
BA4xx2	34.125"
BA4xx3	46.125"
BA4xx4	58.125"
BA4xx6	82.125"

Figure 2
WALL MOUNT



INSTALLATION INSTRUCTIONS



⚠ WARNING

The location for the curtain machine must be structured strong enough to withstand a 4000 lb. load. The wire rope cable used as a drive cable must also have a minimum capacity of 4000 lbs.

Step 1

Install the curtain machine in the location specified on your ventilation system drawing. Using (4) $\frac{3}{8}$ " x 3.5" Hex Head Lag Screws and (4) $\frac{3}{8}$ " washers supplied in the hardware pack. For Typical Mounting Configurations: See Figures 1 and 2, page 4.

Step 2

If the curtain machine will be operating Aero-Baffle or Modular Inlets, install baffle and inlets according to their installation instructions. Install the curtains according to their installation instructions.

Step 3

Cable may be routed into the curtain machine through the slots provided on each side of the unit or through (2) knock outs on the top of the unit. See Figure 3A and 3B.

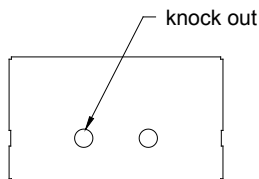


Figure 3A
END VIEW

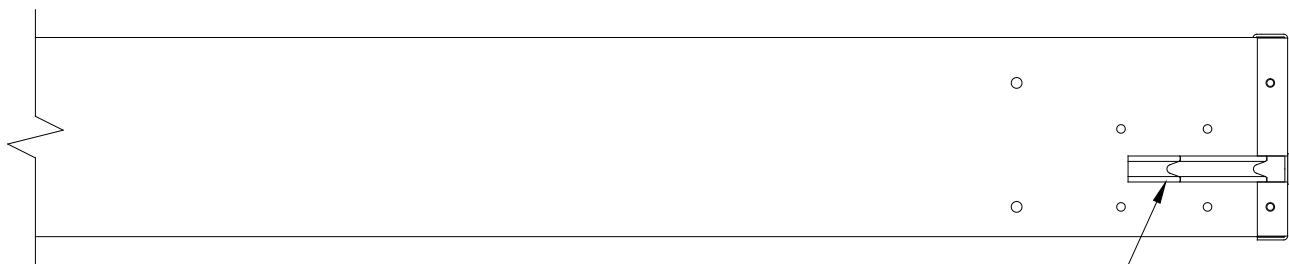


Figure 3B
SIDE VIEW

Step 4

The curtain machine needs to have an equal load on both sides of the pull bar to assure proper operation. **See Figure 4A.** This can be done by mounting the curtain machine in the center of run(s) of Aero-baffle, modular inlets or curtains, **See Figure 4B and 4C.**

Figure 4A
CABLE OUT END

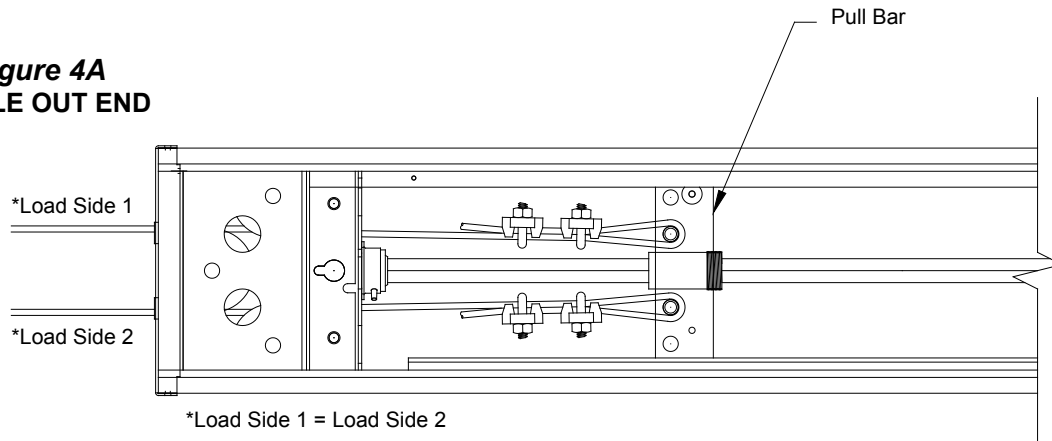


Figure 4B

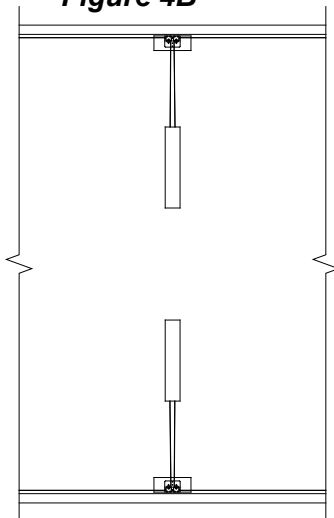


Figure 4C

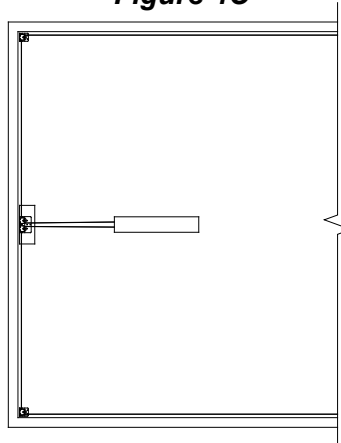
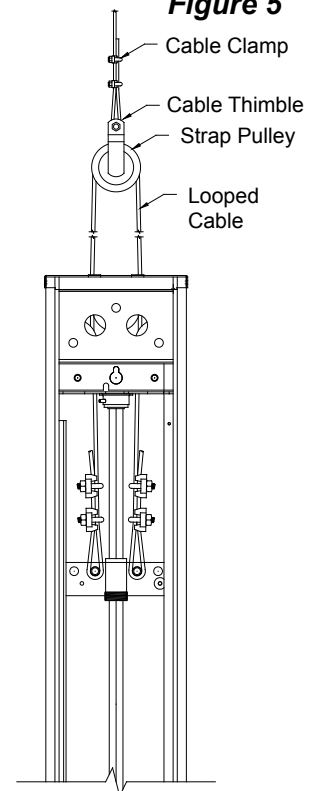


Figure 5



Step 5

If curtain machine can not be mounted in the center for even loading, then make a loop with cable, running the cable through a strap pulley, and attaching the ends of cable to each side of pull bar. **See Figure 5.**

Step 6

If curtain machine is equipped with the Internal Double-Back option (BA4xxx-D) go to step 8, otherwise proceed to step 7.

Step 7A

Route the left drive cable down the inside of the curtain machine to the right side of pin #1. Route the right drive cable to the left side of pin #2. Wrap the drive cables around the corresponding pin to form a loop. Using (2) cable clamps, attach (1) cable clamp 2 1/2" from the top of the pin and (1) cable clamp 1" above the first cable clamp. Leaving a minimum of 1" of cable at the end of each loop (clamps not provided.) **See Figure 6A and 6B.** Follow this step for each drive cable.

Step 7B

Alternative cable routing shown in **Figure 6C and 6D.**

Figure 6A
CABLE OUT END

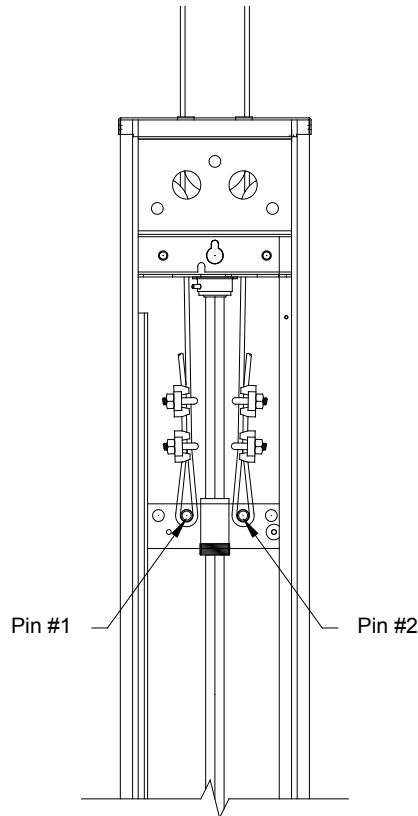


Figure 6B
CABLE OUT EACH SIDE

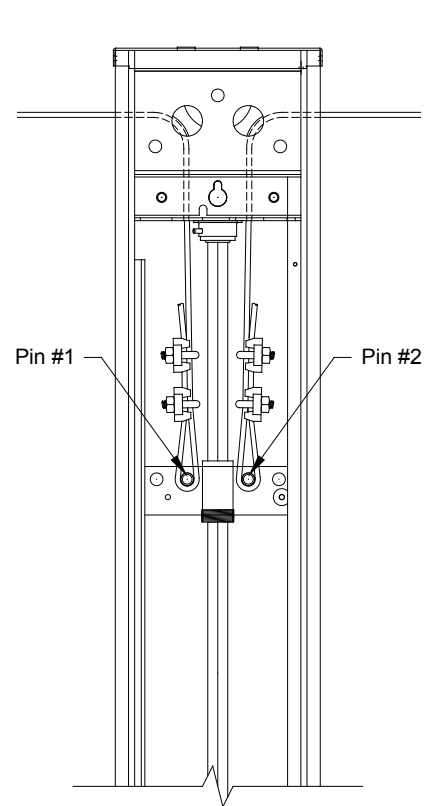


Figure 6C
CABLE OUT LEFT SIDE

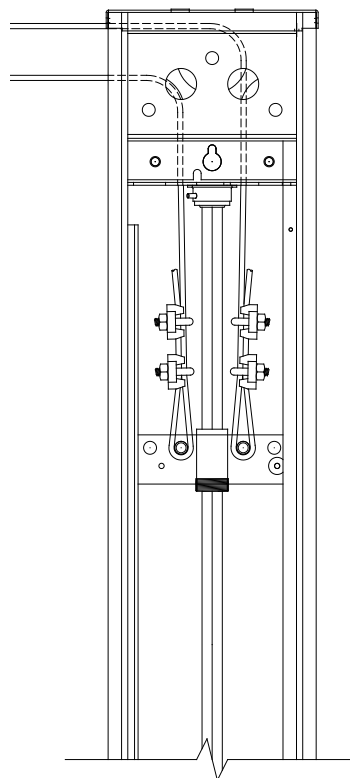
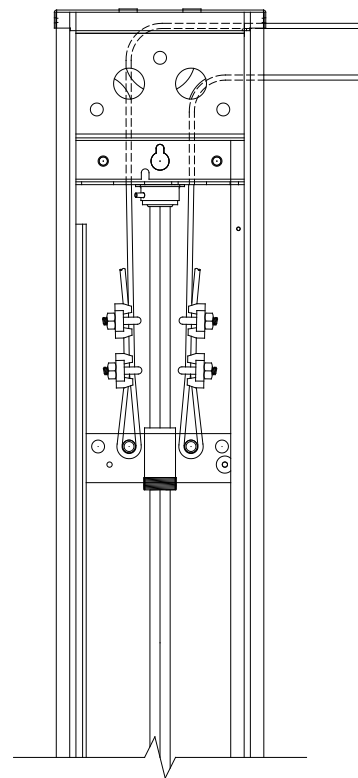


Figure 6D
CABLE OUT RIGHT SIDE



Step 8A

If optional internal double-back was purchased, route the left drive cable down the inside of the curtain machine of the right side of pulley #1. Route the right drive cable to the left side of pulley #2. Wrap the drive cables around the bottom of its corresponding pulley, and take each drive cable to the upper bulkhead and through its corresponding hole. Using (2) cable clamps, attach (1) cable clamp 1" from the cable end and (1) cable clamp below, but as close as possible to the first cable clamp. **See Figure 7A.** Refer to Steps 4-7 for cable routing options.

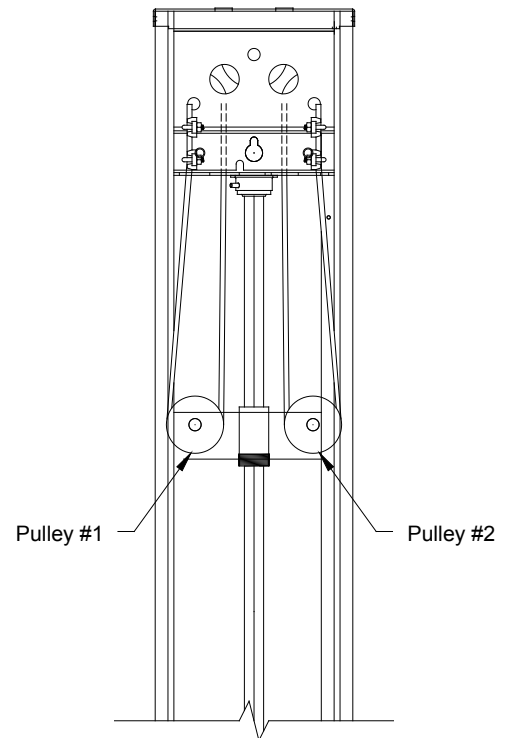


Figure 7A
DOUBLE BACK

Step 8B

If adding the optional internal double-back kit (AC1950), in the field, remove the 2 non-greaseable pins from the cable puller bracket. Then, install the 2 greaseable pins, pulleys and hairpin cotters. **See Figure 7B.**

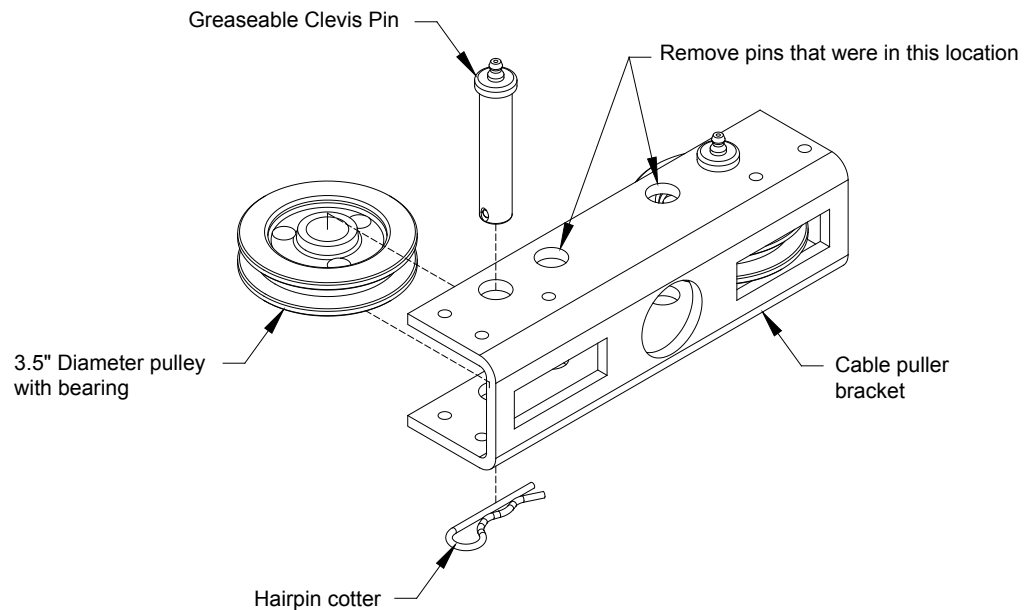
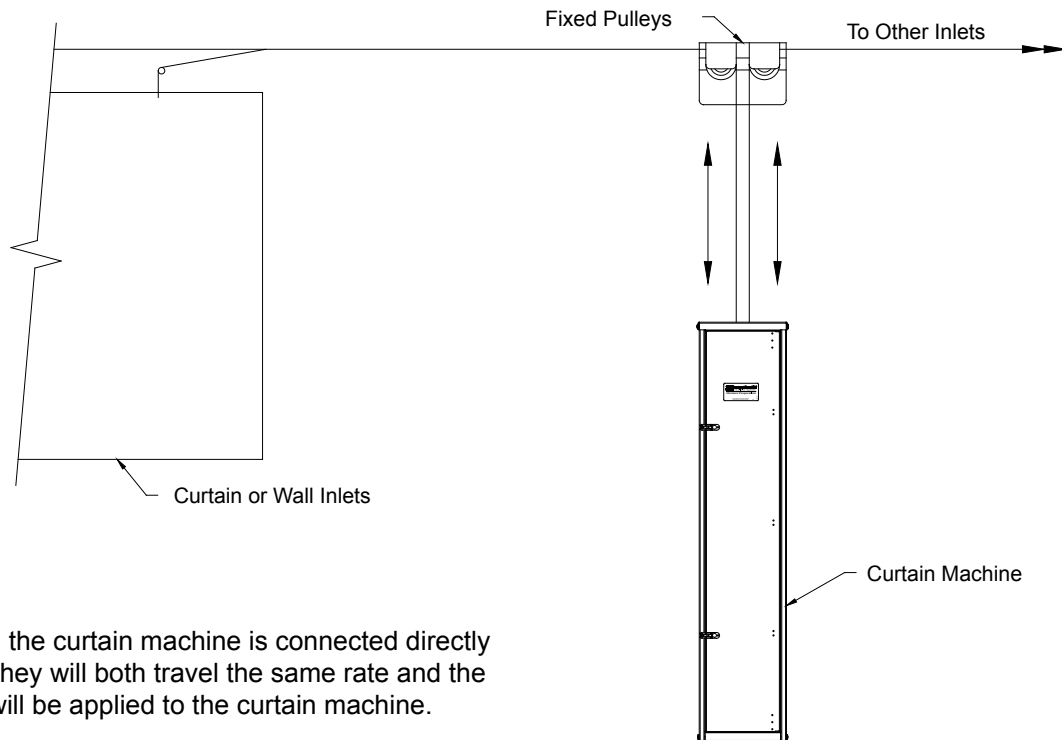


Figure 7B

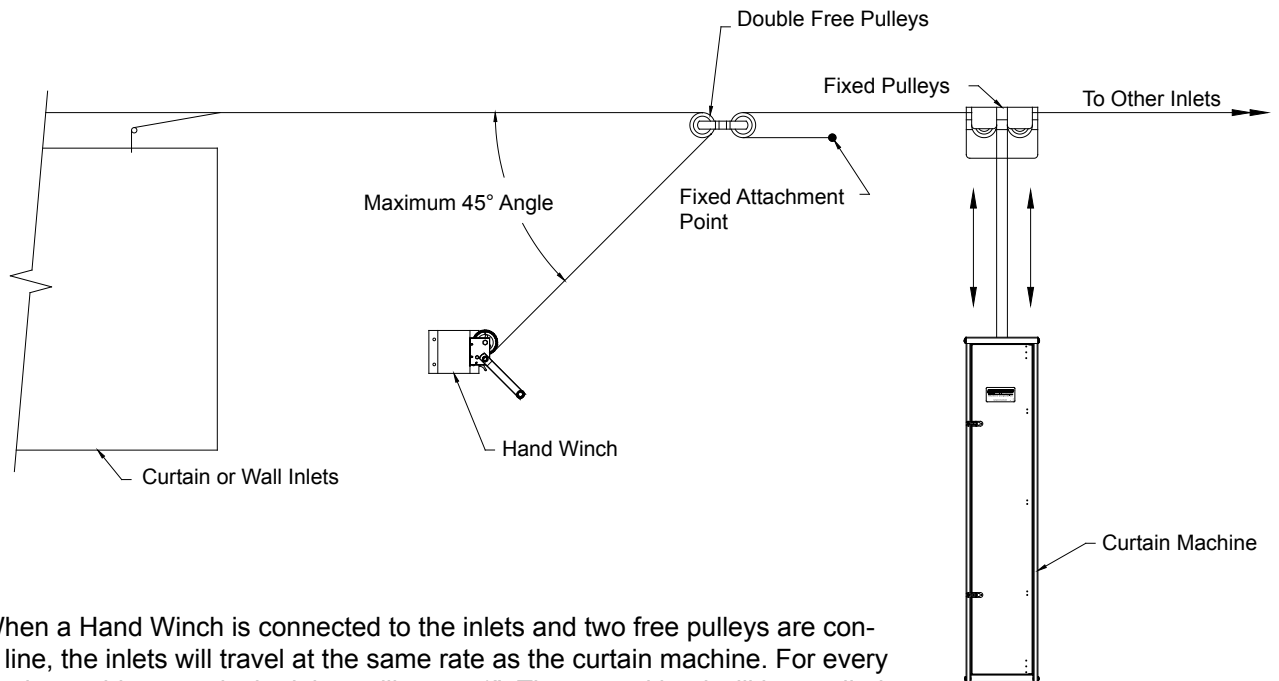
EXTERNAL CABLING METHODS

CURTAIN MACHINE AND CABLING WITHOUT HAND WINCH



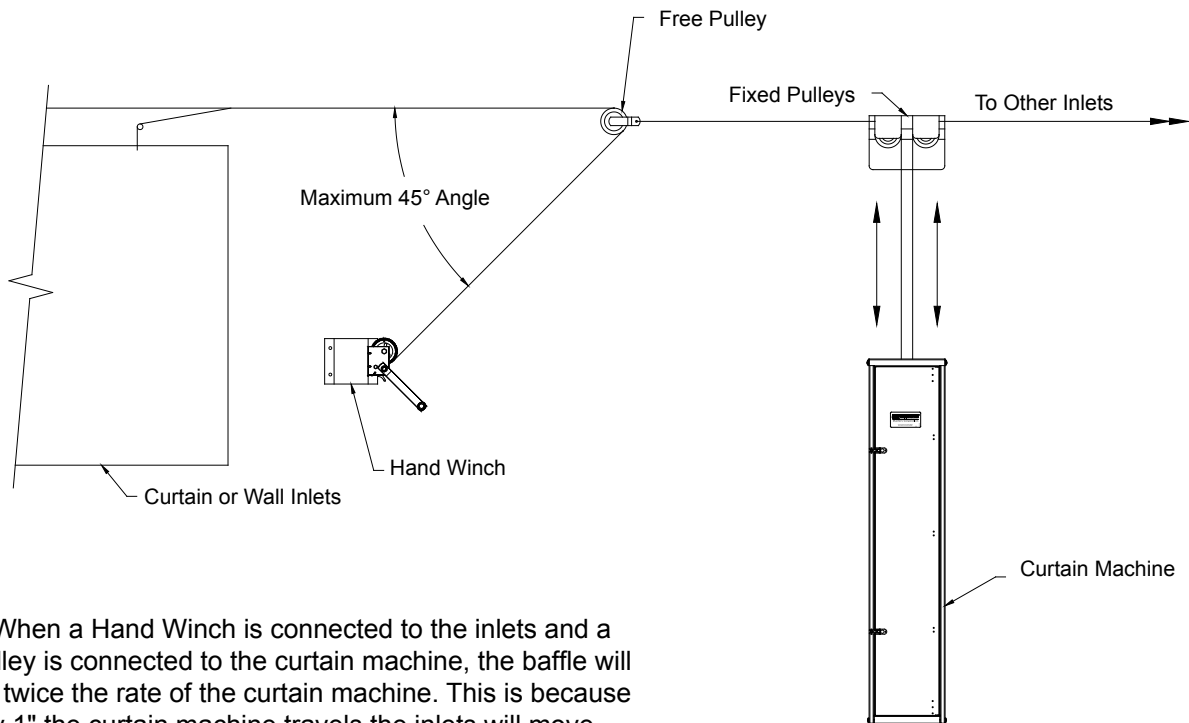
NOTE: When the curtain machine is connected directly to the inlets, they will both travel the same rate and the normal load will be applied to the curtain machine.

CURTAIN MACHINE AND CABLING WITH HAND WINCH INSTALLED



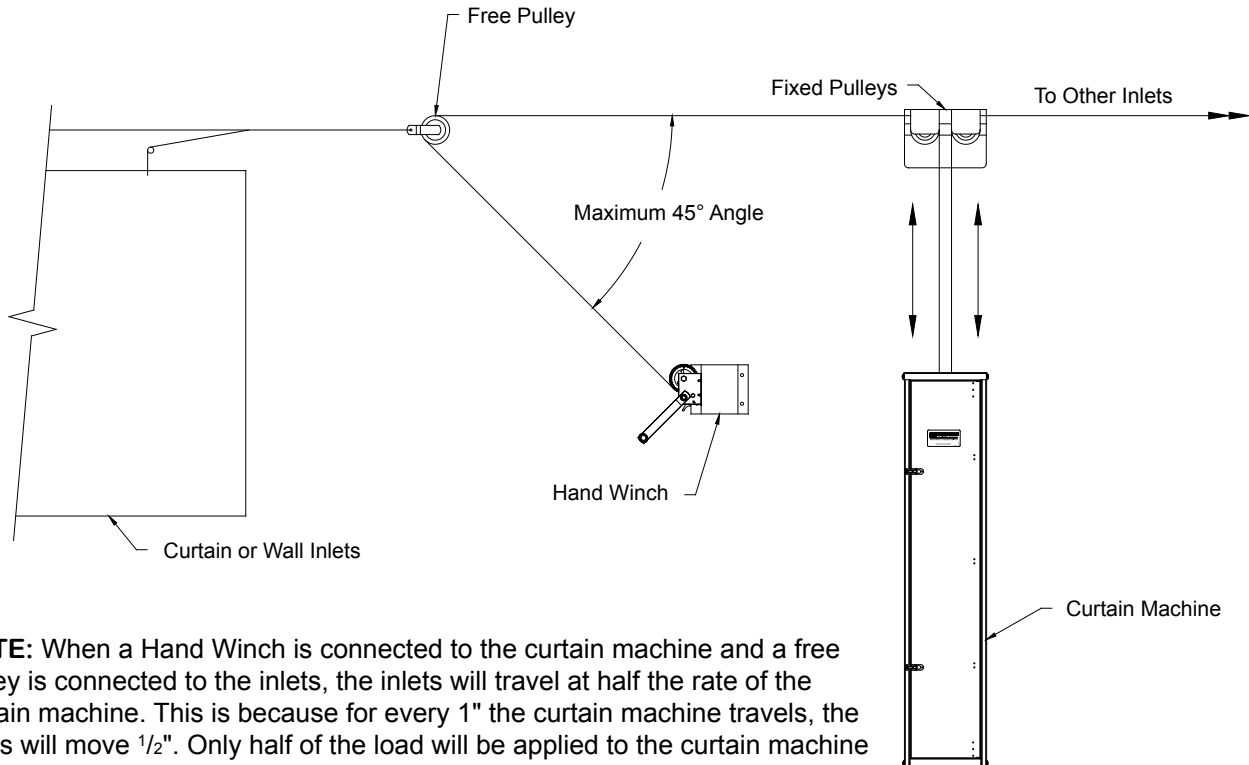
NOTE: When a Hand Winch is connected to the inlets and two free pulleys are connected in line, the inlets will travel at the same rate as the curtain machine. For every 1" the curtain machine travels the inlets will move 1". The normal load will be applied to the curtain machine.

CURTAIN MACHINE AND CABLING WITH HAND WINCH INSTALLED



NOTE: When a Hand Winch is connected to the inlets and a Free Pulley is connected to the curtain machine, the baffle will travel at twice the rate of the curtain machine. This is because for every 1" the curtain machine travels the inlets will move 2". Twice as much load will be applied to the curtain machine therefore, it will have half the pulling capacity.

CURTAIN MACHINE AND CABLING WITH HAND WINCH INSTALLED



NOTE: When a Hand Winch is connected to the curtain machine and a free pulley is connected to the inlets, the inlets will travel at half the rate of the curtain machine. This is because for every 1" the curtain machine travels, the inlets will move 1/2". Only half of the load will be applied to the curtain machine therefore it will have twice the pulling capacity.

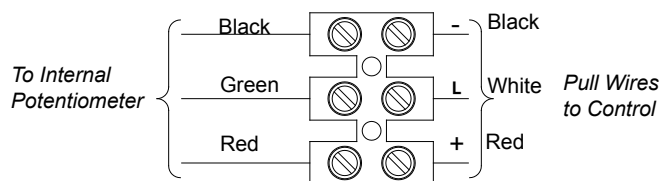
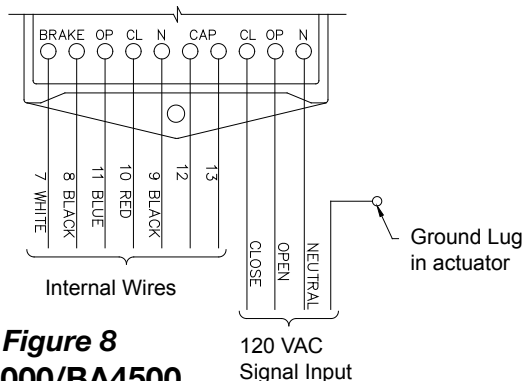
ELECTRICAL WIRING

Step 1

All wiring should be in accordance with National, State and Local electrical codes. Make electrical connections as shown on terminal block label inside actuator. **See Figure 8.** Open, Close and Neutral outputs from the Air-Monitor Control are to be wired to the Open (brown), Close (black) and Neutral (white) inputs of the curtain machine. **See Figure 8.**

Step 2

If curtain machine is equipped with the Potentiometer Feed Back option (BA4xxx-P), connect the inlet position output from the curtain machine to an environmental computer control having inlet capability. **See Figure 9.** Control requires 5k Ω as maximum input.

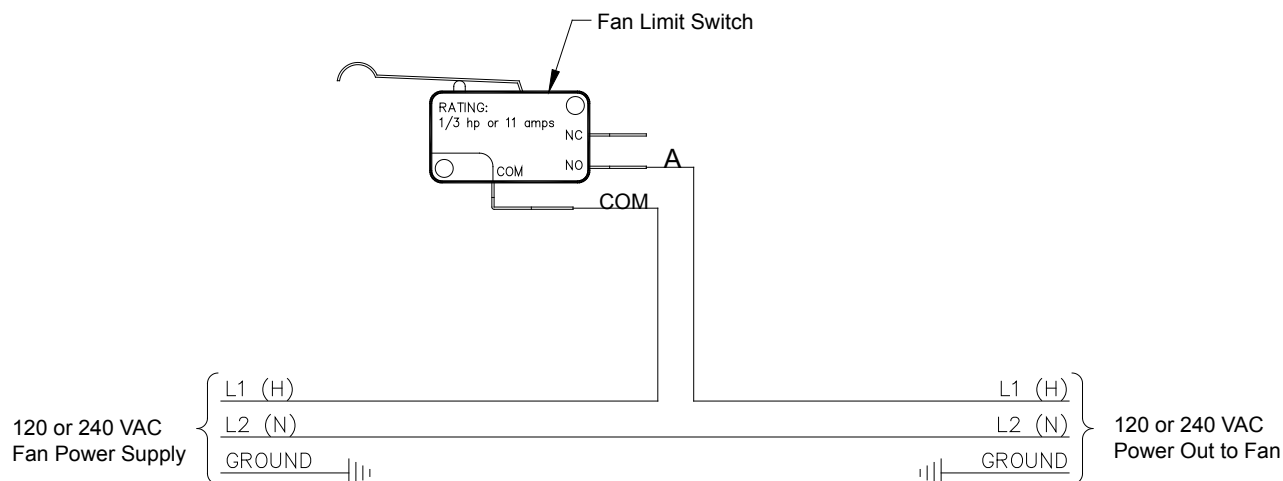
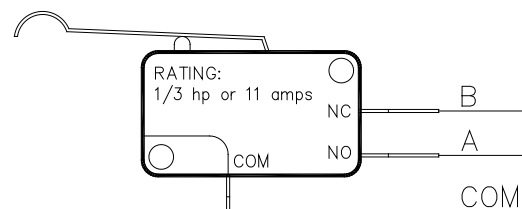


Step 3

If curtain machine is equipped with the Fan Limit Switch option (BA4xxx-F), **See Figure 10.** Limit switch is rated for 1/3 HP or 11 Amps maximum load. If load is less than rating proceed to Step 4, otherwise proceed to step 6.

Step 4

If the limit switch is to turn off the fan when inlets or curtains open, and turn on when curtains close, wire one leg of fan power to terminal marked 'COM' and connect fan wire to the 'NO' contact marked terminal 'A'. **See Figure 11.**



Step 5

If the limit switch is to turn on the fan when inlets or curtains open, and turn off when curtains close, wire one leg of fan power to terminal marked 'COM' and connect fan wire to the 'NC' contact marked terminal 'B'. See **Figure 12**.

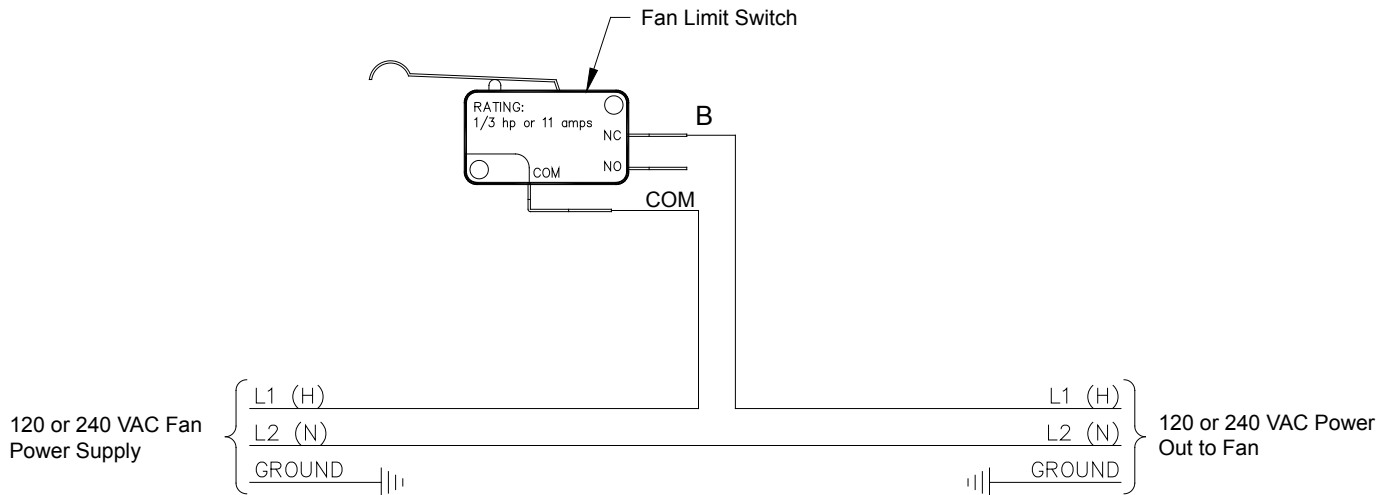


Figure 12

Step 6

When the fan load exceeds the rating of the limit switch, an external load carrying relay (Aerotech SH4120 series) must be used in conjunction with the limit switch. If the load (fan) is to turn off when inlets or curtains open and turn on when inlets or curtains close, wire limit switch and relay as shown in **Figure 13**. If the load (fan) is to turn on when inlets or curtains open and turn off when inlets or curtains close, wire limit switch and relay as shown in **Figure 14**, on page 13.

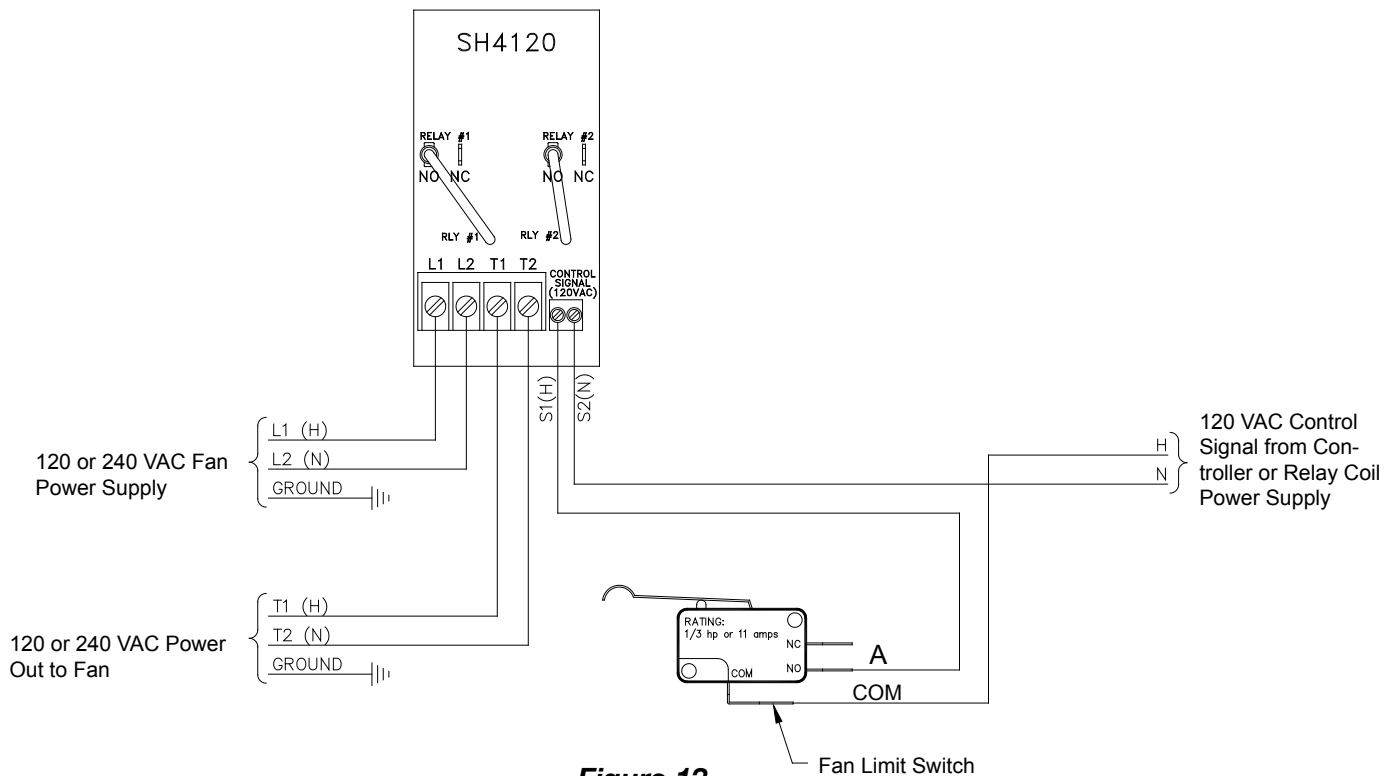
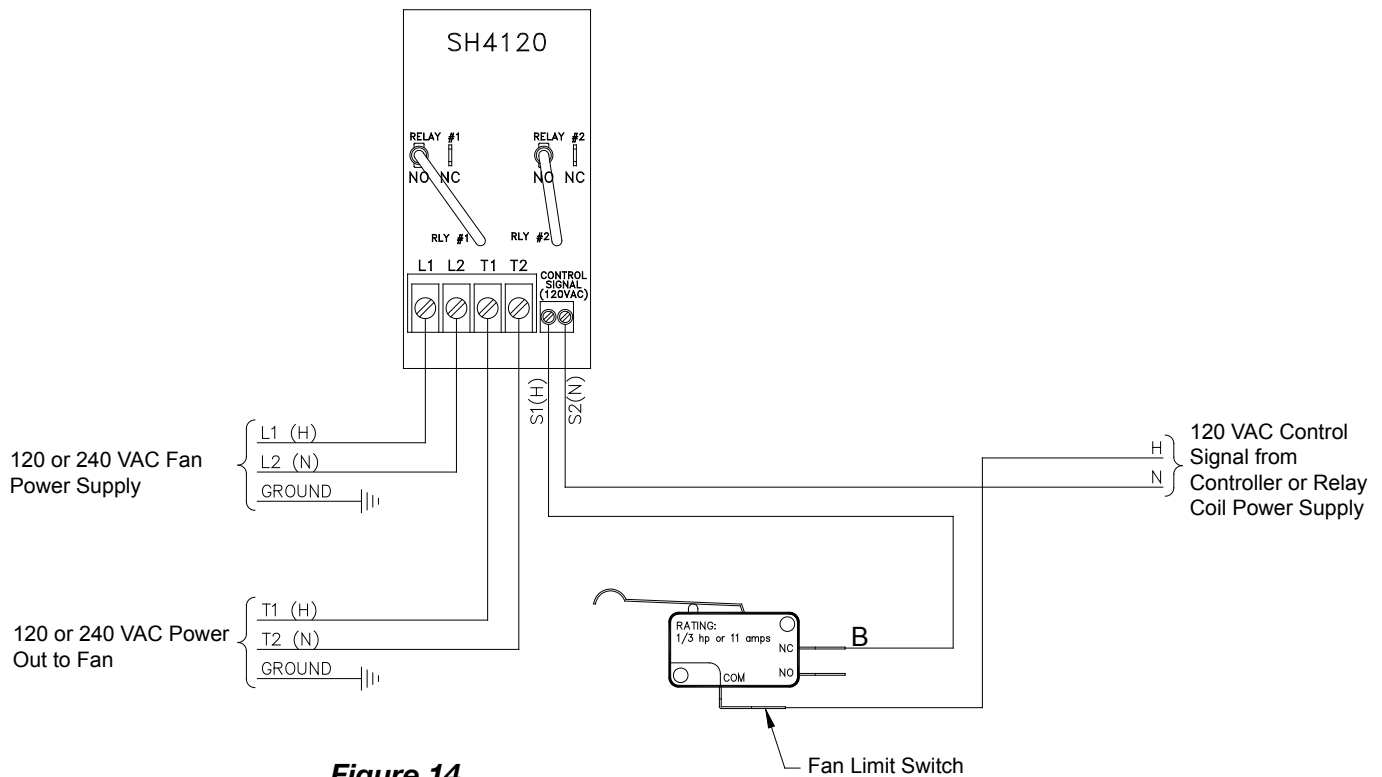


Figure 13



Step 7

Turn on the electrical supply to the curtain machine and the Air-Monitor Control or environmental computer control. Proceed to Operation Section.

OPERATION

NOTE: The curtain machine is shipped from the factory with the open and close limit adjustment clamps set for mid range operation. These clamps **MUST** be set for your installation to assure proper operation.

Step 1

To adjust the close limit switch, manually run curtain machine to the full close position for the curtains or inlets. Position the close limit adjustment clamp against pull bar so that it activates the close limit switch. Manually run curtain machine partially open and back close to check for proper position.

Step 2

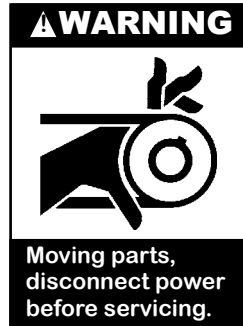
To adjust the open limit switch, manually run the curtain machine to the full open position for the curtains or inlets. Position the open limit adjustment clamp against pull bar so that it activates the open limit switch. Manually run the curtain machine partially close and back open to check for proper position of clamp.

Readjust clamp as necessary.

Step 3

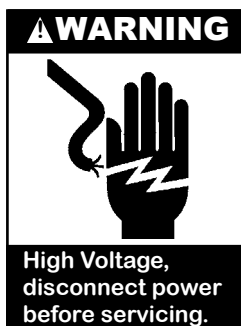
Place all switches and controls in auto. Test operation of curtain machine using the Air-Monitor control or environmental computer control.

MAINTENANCE



- 1) REMOVE DUST BUILDUP FROM CURTAIN MACHINE: using a soft brush or dry cloth. Never use liquids to clean electrical cords or wires.
- 2) GREASE BALL SCREWS AND CHECK PULLEYS: A high quality Lithium based grease should be applied to the ball screw and pulleys every 6 months depending on the frequency of operation. Also, check to make sure that the pulleys will turn freely.
- 3) CHECK CABLES: Confirm that all cables are in good condition and are properly positioned in the groove of the pulleys. Check this regularly to avoid damage to the building or equipment. Check any clamps being used to verify they are secure.
- 4) CHECK LIMIT CLAMPS: Verify that the limit clamps are adjusted to allow the air inlet to open and close within the inlets operating range. This should be performed every 6 months.
- 5) CHECK ELECTRICAL CONNECTIONS: With the power turned off to the unit, verify that the termination points are secure and all wires are in good condition. This should be done yearly.
- 6) CHECK GEARMOTOR AND BRAKE: No lubrication or adjustment is needed on the gearmotor/brake assembly. Some maintenance may be necessary for reliable operation if the unit will sit idle for an extended period of time. If the unit will sit idle for more than one month, the following steps should be performed before the actuator is put back into service.
 - STEP 1 - Apply power to the actuator in the open and then the close direction.
 - STEP 2 - Verify that the gearmotor will operate in both directions.
 - STEP 3 - If the unit will not operate, it may be necessary to "break loose" the gearmotor brake. Turn power off to the unit. Using a pair of pliers or vise grips, turn the brake hex nut 1/4 of a turn. On some units the hex nut may not be visible. If the hex nut is not visible, turn the gearmotor shaft where it extends through the brake 1/4 of a turn.
 - STEP 4 - Perform steps #1 and #2 again. If the unit will still not operate, refer to the troubleshooting procedures for further instructions.

TROUBLESHOOTING



SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Curtain Machine will not close	<ol style="list-style-type: none"> 1. Close limit switch is activated. 2. No 120 VAC at the close input. 3. Brake has not released. 4. Bad circuit board. 	<ol style="list-style-type: none"> 1. Run Curtain Machine off the Close limit. 2. Check for voltage from the Air-Monitor Control. 3. Turn Curtain Machine off and listen at brake for click when turning machine on. If 120 VAC is on wires #7 & #8, brake is bad. Follow maintenance instruction #6. If problem still occurs replace brake. 4. Check for 120 VAC on wires #9 and #10.
Curtain Machine will not open	<ol style="list-style-type: none"> 1. Open Limit Switch is activated. 	<ol style="list-style-type: none"> 1. Run curtain Machine off the Open Limit.

OTHER SYMPTOMS:

If a BA4xxx Series Actuator will not operate, some testing can be performed to determine the cause of the problem. A voltmeter capable of measuring 120VAC will be needed to test the unit thoroughly. To troubleshoot, power must be on. Use **EXTREME CAUTION** when checking voltage. **DO NOT** attempt these tests if you are not experienced in working on electrical control systems, instead contact a qualified electrician or service technician. Refer to the wiring diagram on **page 15** when performing these tests. It is recommended to perform all of the steps listed below in the event that more than one problem is present.

STEP 1: Verify that 120VAC is present at the input terminal block on the circuit board in the actuator. If no voltage is present, the problem is not with the actuator and further testing of the wiring to the actuator should be done. If voltage is present, proceed to Step #2.

STEP 2: Confirm that the limit switch portion of the actuator circuit board is functioning properly. With a close signal present on the input to the board, verify that there is 120VAC between wire #1 and Neutral (N). Change the input signal from a close to an open signal and test for 120VAC between wire #4 and N. If no voltage is present at either of these points, replace the circuit board.

STEP 3: Check the operation of the open and close limit switches. With a close signal to the board, test for voltage between Neutral and #3. If no voltage is present, one of the close limit switches is defective or is in the activated position. With an open signal present, test between wire # 6 and N. If no voltage is present, one of the open limit switches is defective or is in the activated position.

STEP 4: Confirm that the remaining areas of the actuator circuit board are functioning properly. With a close signal present on the input to the board, verify that there is 120VAC on the following points. Test between wires #7 and #8, #9 and #10, N and #13. Change the input signal from a close to an open signal and test for 120VAC at the following points. Test between wires #7 and #8, #9 and #11, N and #12. If no voltage is present at any of these points, replace the circuit board.

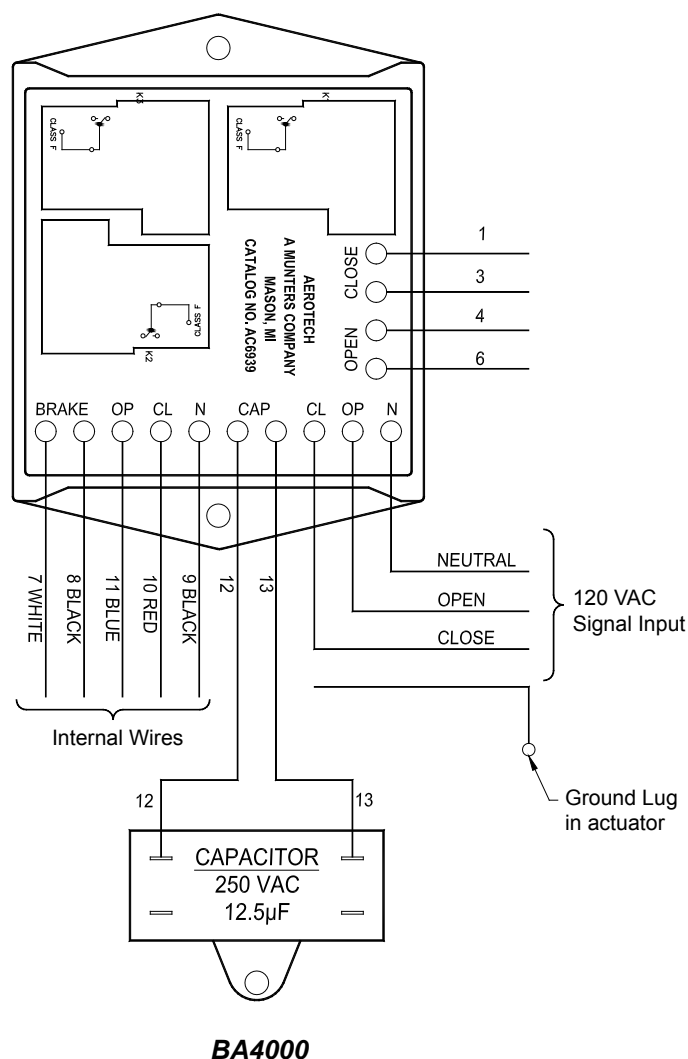
STEP 5: Check the operation of the brake with either a close or an open signal to the unit. It should be possible to turn the brake hex nut freely by hand at this time. If the hex nut is not visible, the shaft extending through the center of the brake should turn freely. If it will not turn freely, the gearmotor brake (Cat. No. AC1934) should be replaced.

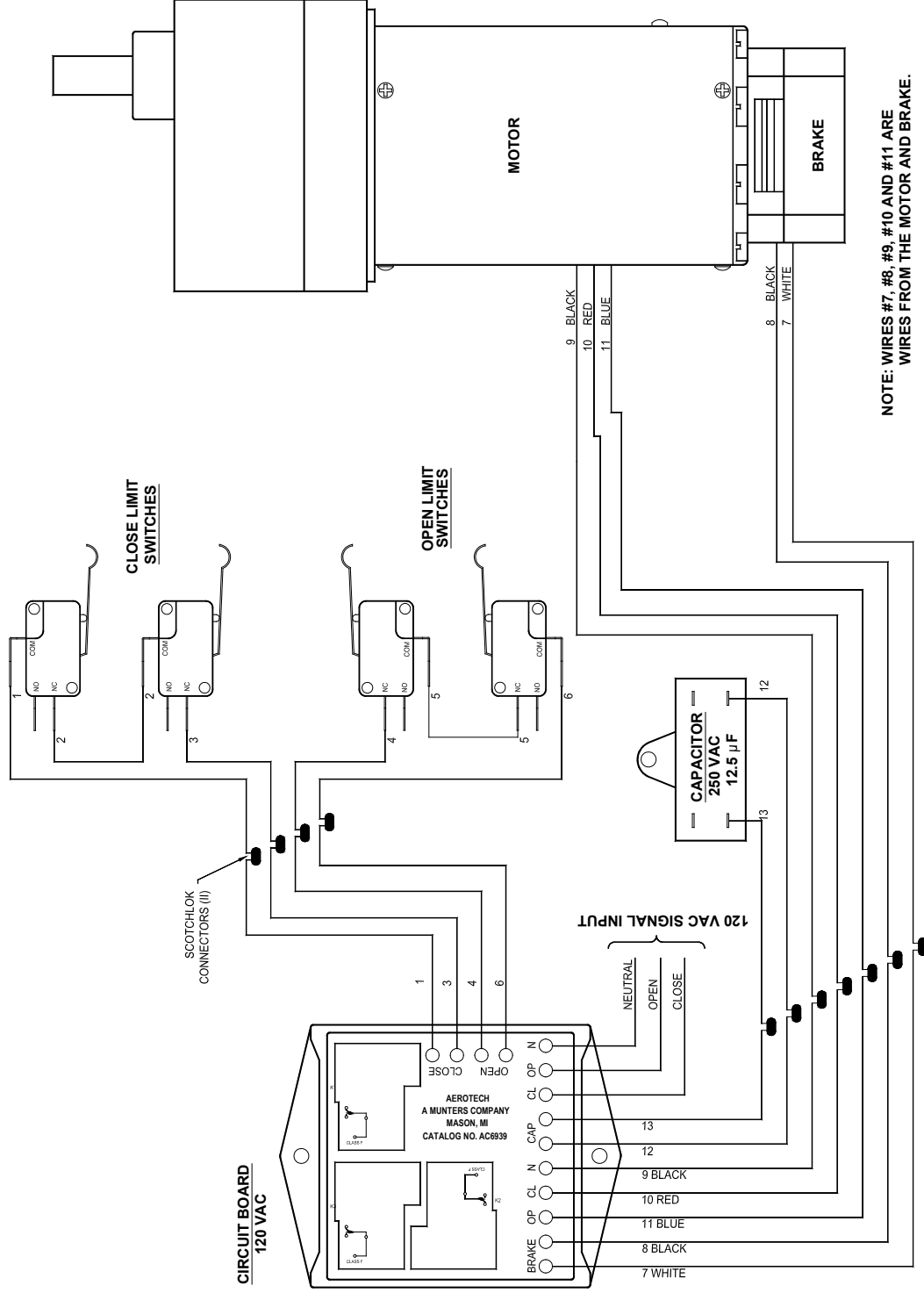
STEP 6: The gearmotor should be tested without the brake installed at this time. The air inlet will fall open when the brake is removed from the gearmotor. The hand winch should be adjusted to open the air inlet to remove the load from the actuator.

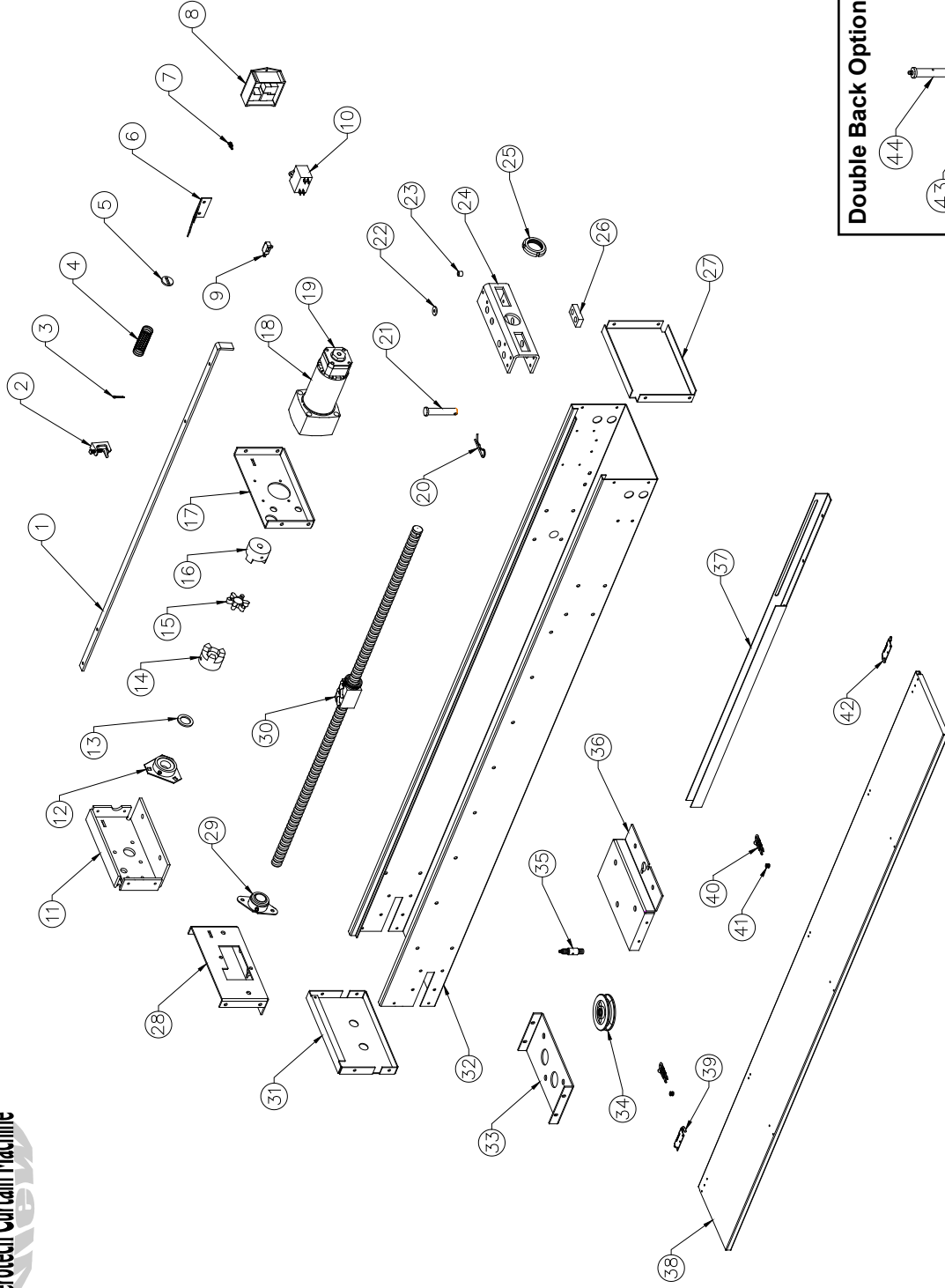
If the brake hex nut is visible it will need to be removed. The hex nut is secured to the motor shaft with two set screws. It will be necessary to loosen both of these set screws so that the hex nut can then be slid off of the shaft. If the hex nut is located between the motor and brake, the brake must be removed rather than the hex nut.

The brake is secured to the motor with two or four machine screws. Remove these screws and take the brake off of the motor. Supply a close and an open input signal to the actuator and verify that the gearmotor will operate in both directions. If the motor will not operate in either of these directions, the gearmotor will need to be replaced. If the gearmotor will run in one but not the other direction, the gearmotor is working, but one of the components discussed in the previous steps is not functioning.

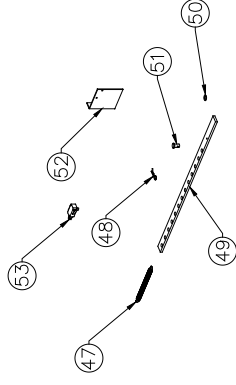
If a replacement gearmotor is required, the AC1934 brake will not need to be ordered as it will be included with the new gearmotor. If the catalog number for the BA4xxx Series Actuator being serviced ends in a -03, the AC1607 gearmotor/brake assembly should be ordered. If the catalog number ends in -30, the AC1606 gearmotor/brake assembly should be ordered.



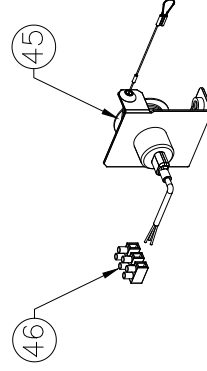




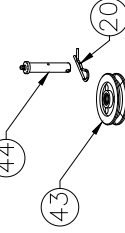
Fan Limit Switch Option



Potentiometer Feedback Option



Double Back Option



Ref. No.	Cat. No.	Description	Qty.
1	AC1955	Bar, limit switch activation, BA4xx2	1
	AC1956	Bar, limit switch activation, BA4xx3	1
	AC1957	Bar, limit switch activation, BA4xx4	1
	AC1959	Bar, limit switch activation, BA4xx5	1
2	AC1941	Clamp, limit adjustment	2
3	KP1052	Cotter Pin	2
4	KX1455	Spring, Compression	2
5	AC1937	Retainer, Limit Switch Spring	2
6	AC1914	Bracket, Open/Close Switch	1
7	KE1154	Connector, moisture resistant 14-22 AWG	11
8	AC1939	Circuit Board	1
9	AC1962	Switch, micro	4
10	AC1608	Capacitor, 12.5 mfd for BA4000 only	1
	AC2503	Capacitor, 12.5 mfd for BA4500 only	1
11	AC1903	Bulkhead, middle	1
12	AC1905	Bearing, thrust, 3-bolt flange, 1"I.D.	1
13	KW4150	Washer, flat, zinc plated	1
14	AC1601	Coupler body, 1" bore, 095	1
15	AC1602	Spider Insert, for 090/095, rubber	1
16	AC1616	Coupler body, 1/2" Bore, 095	1
17	AC1904	Bulkhead, lower	1
18	AC1607	Gearmotor with brake, 3 rpm	1
	AC1606	Gearmotor with brake, 30 rpm	1
19	AC1934	Brakes for AC1606/AC1607, round	1
20	KP1108	Cotter Hairpin, 1/8"D x 2.5"L	2
21	KP1252	Clevis pin, non-greaseable	2
22	KW3023	Flat washer, nylon	2
23	KX1255	Spacer, nylon	2
24	AC1901	Cable puller	1
25	KN1951	Locknut for ballnut	1
26	AC1915	Guide block, on cable puller, plastic	3
27	AC1910	Chassis Cap, bottom end	1
28	AC1902	Bulkhead, upper	1
29	AC1948	Bearing, 2 bolt flange, 1"I.D.	1
30	AC1486	Ball Screw Assembly, BA4xx2	1
	AC1487	Ball Screw Assembly, BA4xx3	1
	AC1488	Ball Screw Assembly, BA4xx4	1
	AC1489	Ball Screw Assembly, BA4xx6	1
31	AC1909	Chassis Cap, top end	1
32	AC1922	Chassis, BA4xx2	1
	AC1923	Chassis, BA4xx3	1
	AC1924	Chassis, BA4xx4	1
	AC1926	Chassis, BA4xx6	1
33	AC1908	Bracket Pulley Cover	1
34	AC1943	Pulley, with bearing	3

Ref. No.	Cat No.	Description	Qty.
35	AC1961	Spindle for 3.5" Pulley	3
36	AC1907	Bracket, Pulley Base	1
37	AC1916	Pull Retainer, BA4xx2	1
	AC1917	Pull Retainer, BA4xx3	1
	AC1918	Pull Retainer, BA4xx4	1
	AC1920	Pull Retainer, BA4xx6	1
38	AC1928	Cover, BA4xx2, w/ hinges/latch	1
	AC1929	Cover, BA4xx3, w/ hinges/latch	1
	AC1930	Cover, BA4xx4, w/ hinges/latch	1
	AC1932	Cover, BA4xx6, w/ hinges/latch	1
39	AC1947	Hinge, cane bolt, RH	1
40	KX1041	Latch, Slide bar assembly, SS	Varies
41	KX1042	Latch, Lock bushing, ZP	1
42	AC1933	Hinge, cane bolt, LH, ZP	
Double Back Option			
43	AC1943	Pulley, with bearing	2
44	KP1253	Clevis pin, greaseable	2
Potentiometer Feedback Option			
45	AC1425	Potentiometer kit, 5kΩ w/ bracket and cable	1 included in AC1425
46	FC1205	3 Pole terminal block, 16AWG max.	1
Fan Limit Switch Option			
47	KX1454	Spring, Tension	1
48	KP1106	Hairpin, Cotter	1
49	AC1911	Bar, Fan Limit Activation	1
50	KW3022	Flat Washer, nylon	1
51	KP1254	Clevis Pin	1
52	AC2501	Bracket, Fan switch	1
53	AC1962	Switch, micro	1